

WHAT IS CLAIMED IS:

1. A magnetic field sensor comprising:

a soft magnetic core formed in a semiconductor substrate to construct a closed-magnetic circuit;

a magnetic field sensing coil formed by a metal film in a structure of winding magnetic core; and

a drive line for exciting the soft magnetic core by directly applying an electric current thereto.

2. The magnetic field sensor of claim 1, wherein the drive line is formed in a rectangular angle to the magnetic field sensing coil.

3. The magnetic field sensor of claim 2, wherein the drive line is connected to both ends of the soft magnetic core in a length direction.

4. The magnetic field sensor of claim 3, wherein the length direction of the soft magnetic core is in a magnetic field sensing axis.

5. The magnetic field sensor of claim 1, wherein the magnetic field sensing coil is wound in a solenoid pattern.

6. A method for fabricating a magnetic field sensor comprising the steps of:

forming a pattern on a semiconductor substrate, corresponding to a lower part of the magnetic field sensing coil, and forming the lower part by first-putting metal into the pattern;

forming a first insulation film on the semiconductor substrate where the metal is first-put;

accumulating a soft magnetic material film on the first insulation film, and forming a soft magnetic core by patterning and etching;

forming a second insulation film on the semiconductor substrate where the soft magnetic core is formed;

forming on the second insulation film a penetrating hole for fluidly communicating with the first-put metal forming the lower part, and also forming a penetrating hole for fluidly communicating with the soft magnetic core;

forming a pattern corresponding to an upper part of the magnetic field sensing coil on the second insulation film, and forming the upper part by second-putting metal

into the pattern; and

forming a protection film on the semiconductor substrate where the metal is second-put.

7. The method for fabricating a magnetic field sensor of claim 6, wherein the method for forming of the lower part of the magnetic field sensing coil comprises the steps of:

forming an oxide film on the semiconductor substrate;

forming a conductive film on the oxide film;

applying a photoresist on the conductive film;

forming a pattern corresponding to a lower part of the magnetic field sensing coil by exposure and development;

first-putting metal into an upper part of the semiconductor substrate such that the metal is filled in the patterned area; and

removing the photoresist remaining after forming the pattern, and the conductive film which is the lower part of the remaining photoresist.

8. The method for fabricating a magnetic field sensor of claim 6, wherein the

method for forming the soft magnetic core comprises the steps of:

forming a soft magnetic material film on the first insulation film;

applying a photoresist on the soft magnetic material film;

forming a pattern on the photoresist, corresponding to the soft magnetic core,

by exposure and development;

removing the soft magnetic material film except for the patterned area; and

removing the photoresist remaining after forming the pattern.

9. The method for fabricating a magnetic field sensor of claim 6, wherein the

method for forming an upper part of the soft magnetic core comprises the steps of:

forming a conductive film on the second insulation film where the penetrating hole is formed;

applying a photoresist on the conductive film;

forming a pattern on the photoresist, corresponding to an upper part of the magnetic field sensing coil, by exposure and development;

second-putting metal to fill in the patterned area; and

removing the photoresist remaining after forming the pattern and the conductive under the remaining photoresist.

10. The method for fabricating a magnetic field sensor of claim 6, wherein the penetrating hole fluidly communicated with the soft magnetic core is formed on both ends of the soft magnetic core in a length direction.

11. The method for fabricating a magnetic field sensor of claim 10, wherein the length direction of the soft magnetic core is formed toward magnetic field sensing axis.

12. The method for fabricating a magnetic field sensor of claim 6, wherein the magnetic field sensing coil is wound in a solenoid pattern.